W. R. KING.

MECHANICAL PLATING MACHINE.

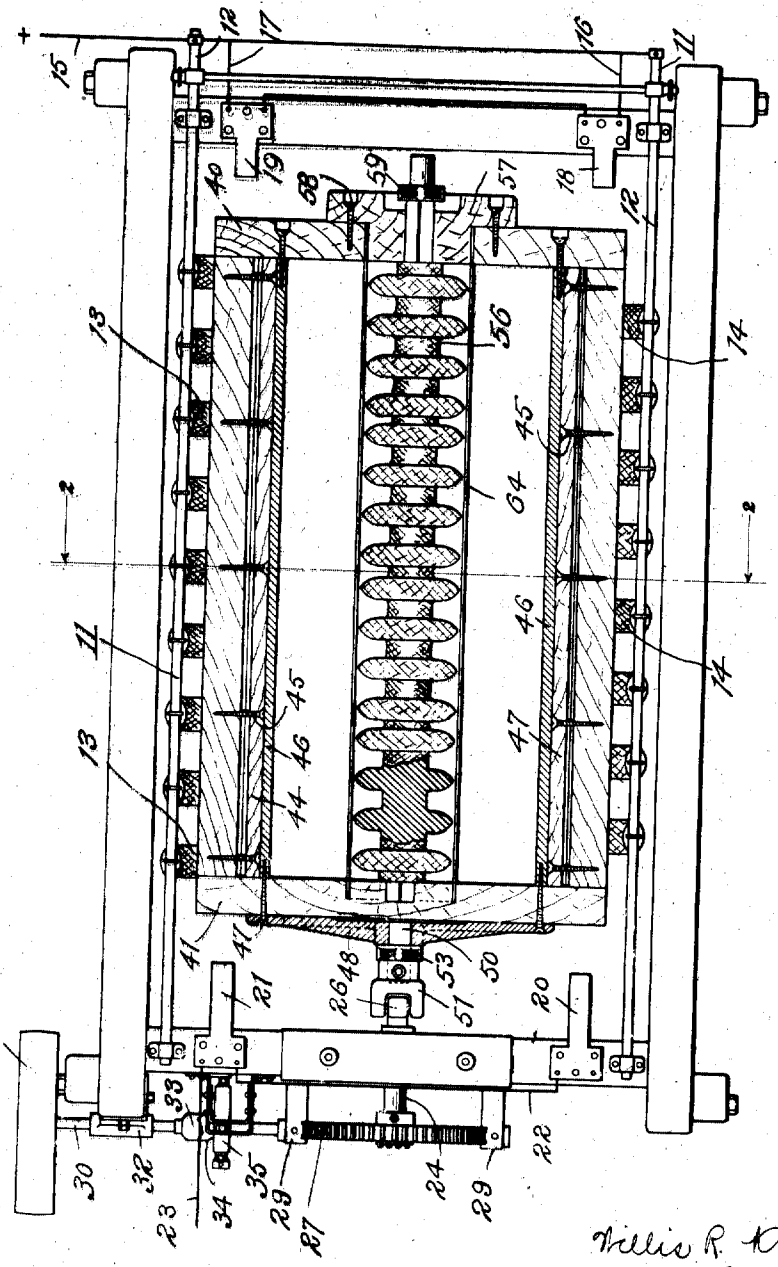
APPLICATION FILED APR. 16, 1917.

1,254,046.

Patented Jan. 22, 1918.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2.

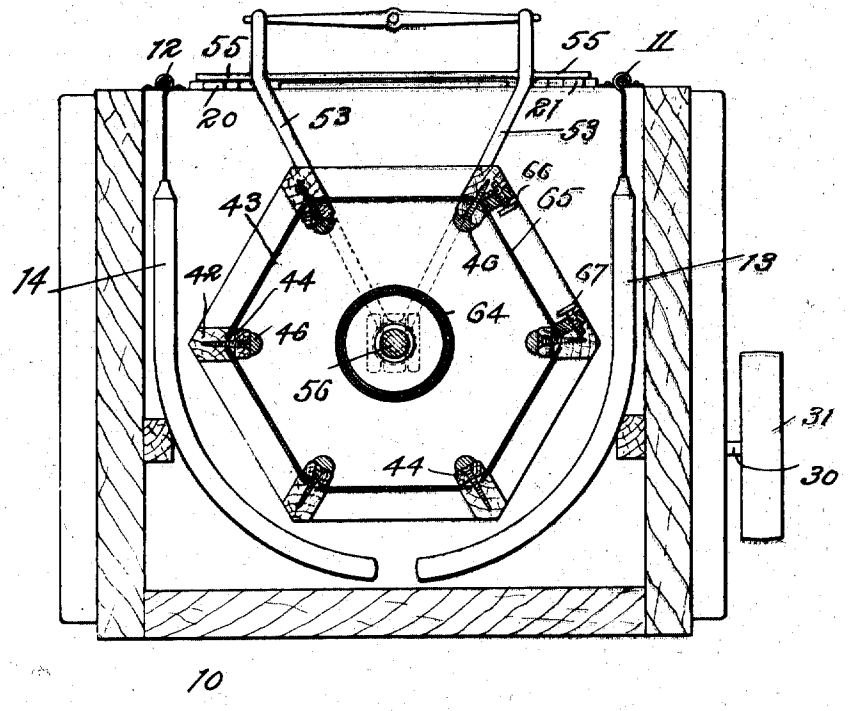
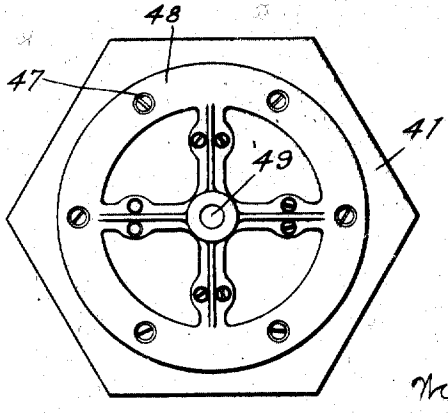


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 4.

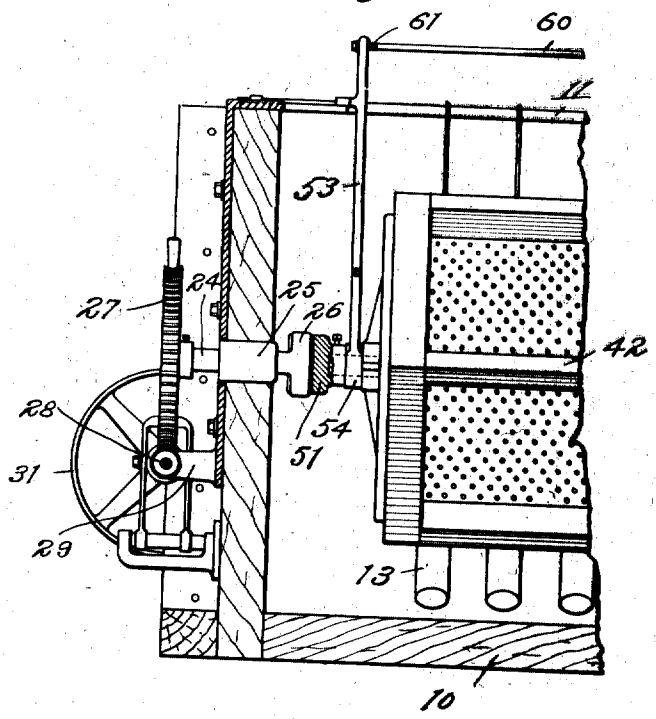
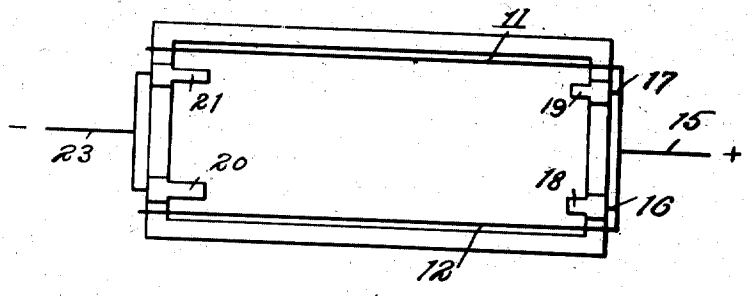


Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIS R. KING, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE HANSON & VAN WINKLE COMPANY, OF NEWARK, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MECHANICAL PLATING-MACHINE.

1,254,046. Specification of Letters Patent. Patented Jan. 22, 1918.

Application filed April 16, 1917. Serial No. 162,449.

To all whom it may concern:

Be it known that I, WILLIS R. KING, a citizen of the United States, residing at Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Mechanical Plating-Machines, of which the following is a specification.

My invention relates in general to electro-plating and analogous operations and in particular to apparatus for plating articles in bulk.

Where the work upon which the plating is to be performed is in the form of small articles to which individual contacts cannot be readily applied, plating barrels and similar apparatus are employed, in which contact with the work is made by its resting by gravity upon suitable cathode elements, and the parts are usually kept in motion so as to bring a constantly varying surface of the articles into contact with the cathode members or into contact with work pieces which receive current from them, and in this way a distribution of the plating over the entire outer surface of the work piece is accomplished. In those forms of rotary barrels heretofore employed, the anodes have been disposed in a plating vat outside of the work receptacle which revolves therein and the cathode elements have been disposed on the inside of the work receptacle, the receptacle being provided with porous or permeable walls through which the circuit from anode to cathode was maintained by the electrolyte. The passage of current was thus from the outside and directed inwardly through the porous walls, the pieces of the work being thus maintained in a position between the axis of rotation and the anodes from which the plating current flowed on its way to the cathodes. The disposition of the anodes outside of the rotating barrel involves a certain clearance space between the anodes and the barrel and brings the work pieces at a considerable distance from the anodes and electromotive force to overcome a corresponding resistance in maintaining the desired current density.

The object of my invention is to improve the current path and to obtain a better presentation of the work while at the same time increasing the efficiency and output of the apparatus.

I accomplish these objects primarily by placing anode material along the axis of rotation within the work receptacle and providing the cathode elements around the inner periphery of the receptacle whereby the current has a direct path and radiates outward from the axial anode to the circumferential cathodes and the interposed work pieces electrically connected therewith by gravity contact. In addition to the axial anode, I may, if desired, retain the usual outside anodes and in that case provide for a supply of current both inward and outward toward the cathode elements.

In order to uniformly consume the axial anode material, it is desirable to rotate the latter with the rotary work receptacle, whereby the plating action is caused to proceed from successive parts of the outer periphery or circumference of the anode material. While annular anodes might be secured upon an axial shaft within the rotary work receptacle, I find that they tend to become loose through being consumed or from other causes, so that it is difficult to insure their long-continued rotation with the shaft. To overcome this drawback, I have employed an axial shaft which itself constitutes an inner rotary anode, which is to be regarded as one of the important features of my present invention.

An embodiment of the invention is shown by way of example in the accompanying drawings, in which,

Figure 1 is a top plan view of an electroplating apparatus according to my invention, with the work receptacle shown in horizontal section;

Fig. 2 is a vertical section thereof on the line 2—2 of Fig. 1;

Fig. 3 is a detail end view showing one of the work receptacle heads;

Fig. 4 is a vertical longitudinal section of one end of the apparatus;

Fig. 5 is a diagram in plan illustrating the electrical circuits.

Referring in detail to said drawings, 10 indicates a tank adapted to contain an electro-plating bath and provided with the usual anode rods 11, 12 upon which may be hung the anodes 13, 14. Conductor 15 leads to anode rods 11 and 12 for supplying current thereto. Branches 16, 17 of conductor 15 lead to contact brackets or seats 18, 19,

which project slightly over the space within the tank. Similar contact brackets or seats 20, 21 are provided in the opposite end of the tank and lead off the current through suitable connections, as for example the conductors 22, 23.

A shaft 24 is journaled at 25 (Fig. 4) in one end of the tank. The inner end of the shaft 24 projects into the space within the tank and terminates in a T 26 which is to form a clutch element for applying rotary motion to the work receptacle as will later appear. A worm gear 27 is fixed upon the outer end of shaft 24 and is engaged by a worm 28 journaled in bearing brackets 29. The shaft 30 of worm 28 is provided with a belt pulley 31 for receiving power, said shaft 30 being journaled in bearing bracket 32 and provided with a clutch member 33 coöperating with a similar clutch member 34 on the worm 27 and drawn into and out of engagement by clutch lever 35.

The work receptacle is in the form of a rotary barrel having perforated or porous sides and adapted to be submerged in the electrolyte bath contained in the tank 10. Its entire weight preferably rests upon the contact brackets 18, 19, 20 and 21 through its supporting frame whereby the desired electrical connections are made with the anode and cathode elements carried by the barrel. In this way the work receptacle is easily removed for replenishing. The barrel heads are indicated at 40, 41 and between them are arranged the longitudinal frame pieces or strips 42. The strips 42 have mounted between them the perforated sheets or plates 43, of for example celluloid, which are confined under strips 44 secured upon strips 42 by screws 45. Upon the inner face of each strip 44, and within the space inclosed by said perforated plates, is secured a cathode bar 46. The cathode bars 46 are electrically connected together by means of screws 47 which pass through the barrel heads and are screwed down against contact disk or plate 48. The disk 48 has an axial perforation 49 in which is fixedly secured a shaft or stud 50, which has secured thereon a U-shaped clutch member 51 adapted to coöperate with the T-shaped clutch member 26 already described and as clearly illustrated in Figs. 1 and 4. The screws 47 in passing through the disk 48 and head 41 secure the disk firmly to the head so that rotary movement can be transmitted to the barrel or work receptacle through the clutch and shaft described. A metallic hanger 53 has a bearing 54 in which the shaft 50 is freely journaled and this hanger is formed with a transverse plate or shelf 55 adapted to rest upon the supporting brackets 20, 21, and thereby the current is led off from the cathodes through the screws 47, disk 48, shaft 50, frame 53, shelf 55 and seats 20, 21. In this way the electrical contact is firmly maintained due to the force of gravity acting upon the supported parts to hold them in firm engagement with the supporting members, while at the same time the constant rotation of shafts 50 within the bearing 54 underneath the liquid bath, insures always a clean surface of contact.

The rotary work receptacle also has an interior anode in the form of a peripherally ribbed axial shaft 56 extending longitudinally therein, with one end squared and seated in the recessed head 41 and the other end having a squared portion passing through a central shouldered block 57 secured in an axial perforation of head 40 by means of countersunk screws 58. The outer end of shaft 56 beyond the squared portion, is reduced and freely journaled in the hanger 59 provided with a transverse plate or shelf similar to that shown at 55 for resting upon the supporting brackets 18 and 19, through which current is supplied. Hangers 53 and 59 are spaced apart at the top by a longitudinal rod 60 which is insulated at 61 from the hanger 53. Current enters from conductors 15, 16 and 17 and passes through supporting plates 18 and 19, into the hanger 59 and anode shaft 56, through the work pieces and the electrolyte in the work receptacle, and then through the cathodes 46 and out by way of screws 47, disk 48, shaft 50, hanger 53, supporting brackets 20, 21 and conductors 22 and 23 back to line. At the same time current also enters from conductors 15 into the anode rods 11, 12, and passes through the anodes 13, 14 and then into the electrolyte and work pieces contained in the work receptacle, from which the current is led off through the circuits already described. A porous or perforated screen 64 surrounds the axial anode shaft 56 so as to prevent direct contact of the work with the anode. This screen is mounted at one end in the head 40 and at the other end on the block 57 and is preferably of celluloid and provided with suitable perforations through which the current may pass.

Access to and from the interior of the work receptacle may be afforded by making one of the panels or seats of celluloid removable as indicated at 65. This panel 65 may for example be removed by taking out the blocks 66, 67 or in any other suitable way. To renew the interior anode, the shouldered block 57 is withdrawn from head 40 and the anode may then be axially removed and replaced.

In operation the work receptacle is filled up to a suitable height with the work and then introduced into the tank, the hangers 53, 59 forming a carrying frame for the work receptacle. When lowered into the tank, the cross pieces or shelves 55 rest upon

supporting contact brackets 18, 19, at the positive end and 20, 21 at the negative end. The electrical connections are thus automatically made in the act of introducing the receptacle into the tank. The clutch pieces 26 and 51 are made to assume the proper relative positions to permit the operative engagement with each other and this position is maintained so long as the receptacle is held in place upon its hangers. The clutch 33, 34 is then thrown into driving engagement and the work receptacle is thus caused to assume a slow and uniform rotary motion, causing the work pieces to tumble over and over and bringing them into contact with the cathode strips 46 and presenting all sides of them to the electro-plating action. This deposition takes place, in the apparatus according to the embodiment illustrated, from within and without, radiating outward from the axial anode 56 to the surrounding cathode strips 46 and inward from the anodes 13 and 14.

I claim:—

1. Apparatus of the character described, comprising in combination a bath container, a rotary work receptacle disposed therein, anode material constituting an integral shaft and anode, mounted axially of said rotary receptacle, and cathode members disposed in said receptacle at a distance from said anode and accessible to the work within the receptacle.

2. Apparatus of the character described, comprising in combination a bath container, a rotary work receptacle adapted to work therein, an axially disposed anode, in said work receptacle, a screen surrounding said anode to exclude the work, and suitably disposed cathodes outside of said screen and carried by said work receptacle for leading off current from the work pieces.

3. Apparatus of the character described, comprising in combination a bath container, a work receptacle adapted to rotate therein and having at one end a head provided with a shouldered block adapted to sit within an axial perforation of the head, an anode shaft axially disposed at one end in said block, a screen mounted on said block and inclosing said anode, and suitable cathodes for leading off current from the work in said receptacle.

4. Apparatus of the character described, comprising in combination a generally cylindrical rotary work receptacle having an axial opening through one end, a removable closure for said opening, an axial anode of suitable dimensions to be introduced and withdrawn through said opening, suitably disposed cathode material and means for making electrical connections with said anode and cathode material.

5. Apparatus of the character described, comprising in combination a generally cylindrical rotary work receptacle having an axial opening through one end, a removable closure for said opening, an axial anode adapted to be introduced through said opening and having one end passing through and projecting from said closure and the other end seated in the opposite end of said receptacle, a separate shaft or stud projecting axially outward from said opposite end of the rotary work receptacle, cathodes electrically connected with said separate shaft or stud, and means for supporting and making electrical connections with the projecting shaft portions.

WILLIS R. KING.